PATENT APPLICATION

TITLE: METHOD FOR IMPROVED VERTICAL SWEEP OF OIL RESERVOIRS

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This application claims the benefit of U.S. Provisional Patent Application No. 60/469,700, filed May 12, 2003.

BACKGROUND OF THE INVENTION

1.   FIELD OF THE INVENTION

[0001]   This invention pertains to recovery of crude oil from subterranean reservoirs by injecting both water and a second less dense fluid to displace the oil, preferably through horizontal wells. The invention is based on the proper selection of spacing and relative location of injection and production wells, and proper selection of injection rates and location of injection completion intervals for both water and the second fluid.

2.   DESCRIPTION OF RELATED ART

[0002]   Although gas efficiently displaces oil in a vertical downward displacement that is aided by gravity, gas displacement of oil by predominantly horizontal flow is inefficient because of the low viscosity of the gas relative to the oil. The gas fingers through the oil, giving poor conformance and resulting in a low recovery of the oil. Injecting water along with the gas was proposed to control this fingering and poor conformance. The water decreases the mobility of the gas by lowering the relative permeability of the formation to the gas. Field tests showed it was most feasible to inject the water alternately with the gas. This process is known as WAG flooding. The ratio of the volume of water injected to the volume of gas injected is the WAG ratio. Injection of any second fluid, not just gas, alternately with water is now termed WAG flooding. Much of the literature on WAG flooding has centered on the use of water and miscible or nearly miscible fluids that reduce the residual oil after flooding to a value near zero. However, immiscible gases may also provide a substantial beneficial lowering of the residual oil. Thus if miscible gas is not available, or is too expensive to use, then immiscible gases should be considered for WAG flooding.

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